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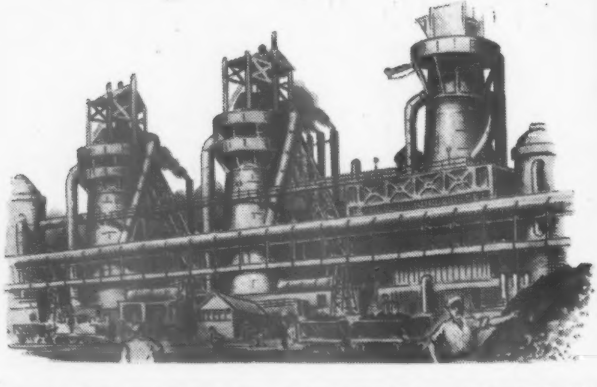

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The British Foundry School

We have recently been giving a good deal of both time and thought to the subject of technical education. This has been brought prominently before the industry because of the recent publication of the White Paper. In all these discussions somebody has invariably drawn attention to the need for the re-establishment of the British Foundry School. It is insufficiently recognised in foundry circles that from the point of view of the Board of Education, this was a unique experiment. Here for the first time in history, the Board gave financial backing to a scheme not sponsored by a local education committee, but one launched by the more enlightened section of a very widely dispersed industry. After a reasonably good start, there was for two successive years a decline to an enrolment of four students, followed by an increase to twelve. Then the war came, and unfortunately the School was disbanded. This was due to the quite logical thought that the type of student suitable for following such a specialised course would be better employed on actual production. With the passage of time it now becomes quite clear that its continuation would have helped to provide a nucleus of key men, well adapted by their training to take full charge of new foundries, extensions, and changed type of production. Most people interested in foundry educational schemes are anxious that there should be a minimum of delay in re-establishing the scheme at the earliest possible moment. They base their reasoning on the following grounds: (1) Should the war continue for a fairly long period, graduates from the School would be a real asset in improving both output and quality from lower grade material, and (2) should the war suddenly collapse, the School would be in a position to give refresher courses to Service men recruited from the foundry industry and to others who have for long periods been divorced from their real jobs. The difficulties of re-establishment have been enumerated as follows: (1) The possibility of convincing the man-power board as to the fundamental necessity for such a training scheme; (2) the creation of the permanent teaching staff; (3) the continued support of the Board of Education, and (4) the doubt as to whether the experts in the industry would be able to find time to act as visiting lecturers. A good deal of exploratory canvassing would be necessary before answers could be given as to the real gravity of these difficulties. Yet such investigations would be worth while, for it would at least ensure that the machinery was in running order for the re-establishment of the School at the earliest possible moment after the cessation of hostilities. We have several times been asked as to how the British Foundry School would align itself with the general principles of education as envisaged in the White Paper. To them we have expressed our views that not only does it merely fit in, but such schools will be an integral part of the scheme. It is thought that more than one Foundry School will be necessary, whilst we are assured that the various branches of engineering will certainly establish a number of similar colleges. It is quite obvious that in the future the added period of primary and secondary instruction, possibly coupled with a term of compulsory military training, will step up the age at which young people can assume executive positions in industry, and we look to such institutions as the British Foundry School, by its intensive training system, rapidly to create such leaders. No doubt this is why there seems to be such a desire on the part of the leaders of the industry to hurry along with the re-establishment of the School.

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FRUSTRATED CONTRACTS

By F. J. TEBBUTT.

The Law Reform (Frustrated Contracts) Act, 1943, is a measure which commercial interests should note, for it is not merely a wartime measure; it can be regarded as permanent law, as far as any Act is permanent. This Act concerns contracts which have become impossible of performance or otherwise frustrated by some event which has prevented the performance of the contract, and so the contract ceases to have effect from the date of frustration. Until this Act the legal position was, that if money was paid on the contract that money was required to be handed back, notwithstanding that the person who was to execute the contract had been put to expense towards the fulfilment of the agreement, as example had acquired materials or started manufacture and so forth. Now, this new Act makes clear that while ordinarily any sums received must be handed back (and are recoverable) any sums expended in pursuance of the contract up to the date of frustration can be deducted or recovered. For example, suppose the contract concerns the supply of machinery or plant (where sums are frequently paid in advance); any sums so paid were required to be paid back notwithstanding that the job had been started, materials acquired and so forth. Now the person incurring that expense can deduct from the money paid or take into account any sum expended in pursuance of the contract before the frustration date.

Another provision makes clear the legal position where anything has been done which gives some benefit to the other person before frustration occurs. Formerly the position has been that a person even though he had received valuable benefit before the date of frustration was not liable to pay anything, until the contract was completed, and with frustration occurring that time might never arrive. Now, if a person has received such benefit he must pay for it, although his own expenses can be taken into account and the circumstances giving rise to the frustration must be considered. For example, suppose again a machinery contract; if certain machinery has been supplied these items of machinery must be paid for, as must anything else done which is of benefit to the party concerned. Another example may be shown, say building, etc., operations (*e.g.*, alterations or decoration, etc.), where after certain work has been done frustration occurs, say, through lack of materials, or stoppage of supplies, through building orders, etc.; now payment must be made for work done up to the time of frustration.

Unless there was an obligation to insure expressly provided for in the contract or under any enactment, no account is to be taken of any sums payable by reason of the occurrence of the circumstances giving rise to the frustration under a contract of insurance. In estimating the amount of any expenses incurred by either party, there can be included reasonable over-

(*Continued at foot of next column.*)

INSTITUTE OF VITREOUS ENAMELLERS

The annual general meeting of the Institute of Vitreous Enamellers will be held on Saturday, October 9, at 10 a.m., at the Waldorf Hotel, Aldwych, London, W.C.2. After the annual business of the Institute has been dealt with, a Technical Session will open between approximately 11 and 11.30 a.m., when the following four Papers will be presented and discussed:—

Technical Paper No. 43/1: "Post-war Developments in the Enamelling Industry," by J. T. Gray (Stewart & Gray, Limited, London).

Technical Paper No. 43/2: "A Free Industrial Enterprise Challenge: Will the Ceramic Industries be Prepared for Continuity of Change?" by G. H. McIntyre (Ferro-Enamel Corporation, Cleveland, Ohio). (Presented for discussion by S. W. Vickery.)

Technical Paper No. 43/3: "Developments in Thermal Technique as Applied to Vitreous Enamelling Processes," by J. Fallon (Incandescent Heat Company, Limited, Smethwick).

Technical Paper No. 43/4: "A New Test for Measuring Enamel Slip Consistency," by Dr. G. T. O. Martin (Hon. General Secretary and Research Officer).

The meeting will adjourn for lunch at 1 p.m. and resume at approximately 2.15 p.m. The Institute extends a cordial invitation to all those interested in the Papers to be presented and would welcome their participation in the discussions. Full particulars of the meeting may be obtained from the Hon. General Secretary, Institute of Vitreous Enamellers, Alvechurch, Birmingham.

NOTES FROM THE BRANCHES

Wales and Monmouth.—The session opened with a series of works visits of a type which so far as is known is unique. Three firms—Goulds, Limited; Williams Alexandra Foundry, Limited; and John Williams & Sons, Limited—all opened their works, whilst the last named acted as hosts for tea in their canteen. About 50 members participated. The vote of thanks was acknowledged on behalf of the hosts by Mr. Harold Williams. A full programme for the 1943-44 session has been arranged.

PAPER IS STILL A VITAL MUNITION

(*Continued from previous column.*)

head expenses or expenses in respect of any work or services performed personally by the particular party. In conclusion, it should be understood that there is nothing to prevent contracts, covering circumstances which otherwise would come under the law of frustration, being made; that, of course, is a question for the parties when making a contract.

SOME ASPECTS OF THE PRODUCTION OF MALLEABLE IRON CASTINGS

Report of Discussion at Institute's Annual Conference

Considerable interest was shown at the London Annual Conference of the Institute of British Foundrymen in Mr. J. Roxburgh's Paper on the above subject. Problems in gating, the preservation of chills, the need for revised specifications, were amongst the subjects raised.

A Revised Specification Sought

The discussion was opened by MR. G. R. WEBSTER, who drew attention to the first paragraph of the Paper, containing a quotation from the 1928 Paper of W. T. Evans and A. E. Peace, to the effect that a reliable product from both blackheart and whiteheart varieties of malleable castings was being produced, and Mr. Roxburgh's own statement that the engineer had every confidence in the use of malleable castings for certain application to-day. Whilst agreeing with both those statements, Mr. Webster complained that the current specification for malleable castings was quite out of date, and he urged that the I.B.F. should help to produce a new specification now which would assist engineers and designers in the design of their plants. It was well known, he said, that the existing specification could be met very easily by the "backyard foundry." Certainly the yield point, which is of great importance, should be included in the new specification, for it was on that factor that the engineer was able to design his plant. Every effort should be made immediately—and war-time was not inopportune—to bring forward a new specification, for immediately on the cessation of hostilities the industry should be ready to go right ahead. Certainly the existing specification would hinder the industry's progress.

MR. H. H. SHEPHERD complimented Mr. Roxburgh upon his very interesting survey of modern malleable foundry technique. On the question of producing a new specification for malleable castings, he said the Committees of the Institute and of the B.C.I.R.A. were working together, and ultimately the malleable castings specifications would be such that engineers would feel they had available a product which they could use to a greater extent than it had been used in the past.

Spherical-shaped Feeder

With regard to the use of the spherical-shaped feeder, he said that unfortunately there was a tendency among many patternmakers to avoid its use. They would agree that the job could be done with the spherical-shaped feeder; but often when the pattern reached the foundry one found that the shape of the feeder was anything but that which was designed to enable the founder to overcome the troubles that were likely to arise. Troubles would arise if one did not devise a feeding head which would give maximum feeding facilities and the minimum of difficulty from local crystallisation. Mr. Roxburgh's Paper would have been well worth while even if it had been confined merely to emphasising those points.

The malleable founders in the United States had suffered in very much the same way as the malleable founders in this country. From time to time statements had been published decrying the efforts of the British malleable castings industry, and pointing to the industry in the United States as an example of a 100 per cent. effort. The fact was, however, that until the outbreak of the war the malleable trade in the States was declining rapidly. But, even when there was a decline in production generally, organisations such as the Saginaw Division of General Motors Corporation were actually increasing their production. The reason was that they were always up-to-date in their methods and would not allow any antiquated practice; those organisations, and some foundries in this country, were producing castings in malleable iron such as the engineers would not have dreamed of entertaining at one time, and they were getting very good service from them. If one compared the figures of malleable iron production in this country with those of any Continental country or the United States, one would find that, proportionally to the populations, this country was doing as well as any. It was all very well to quote figures of 700,000 tons for America and 60,000 tons for Great Britain; but proportionately we were not behind. He mentioned the matter because he was a firm believer in the future of the malleable industry, if the malleable industry itself would be a firm believer in its own future.

Chill Coatings

Whilst he had no criticism to make of the practice of coating chills with a core oil or similar type of oil, Mr. Shepherd said that in his experience it was a good plan, for some jobs in malleable form, to shellac the chills and to dust them with very fine sand; but care must be exercised to ensure that the sand was not dusted on to the chill thickly. He used the burnt or dead material from annealing pot bating suitably crushed. He did not claim originality for this method, it had been published both in this country and in America; but in his experience it did help to increase the life of chills and to prevent their sticking.

Again, if one used chills which had become badly scaled one would probably find considerable thickening of the chills and also—a more dangerous occurrence from the point of view of the malleable castings producer—the presence of primary graphite. He had not studied the problem very deeply yet, but he and his colleagues were inclined to the view that it was due to the effect of oxide coating on the chill, on the molten metal; that effect was a type of inoculation

Malleable Iron Castings

which resulted in the precipitation of primary graphite. When this occurred he had cured the trouble by replacing the old chills by new ones.

Finally, with regard to sands, he asked whether the bentonite which Mr. Roxburgh had used was of the western or southern variety. The bentonite which came into this country at one time, he said, was of the western type, which was not very useful to the malleable founder; it gave rise to cracks and other troubles, because it possessed very high hot and dry strengths. He had adopted Fulbond, the new British substitute for bentonite.

Density of Ramming and Tears

MR. G. R. SHOTTON thanked Mr. Roxburgh for a paper which was practical in the best sense of the term, in that it dealt with technique and not merely with method. With regard to the use of synthetic sands, he referred to a statement in the paper that, due to the lower moisture content, there was delayed freezing of the casting and a consequent increase in pulls and tears. Whilst he could not contradict the statement, he suggested that a factor which governed to an even greater extent the occurrence of pulls and tears was the density of ramming. This supposition was confirmed by the statement on page 5 of the Preprint to the effect that, presumably owing to the greater permeability of the synthetic sand, " it was found that synthetic sand could be rammed at least three to four times harder than with natural bonded sands. . . ."

As to the statement that the backing sand used had shown an increase in permeability through continued use, and that when the sand was re-conditioned the permeability was reduced again to 75 or 100, Mr. Shotton asked for further explanation, because he did not understand why that should be so.

Coming to the photographs of castings and the runners and risers used, he said the author appeared to have achieved almost the impossible in some cases; it was an outstanding achievement to have done so much with so little feeder metal. In the case of the tank hub casting in Fig. 12, it was surprising that such a very heavy flange around the centre of the casting could be made completely sound with simple joint feeders, where the heavy section was at a higher level than the feeder. Where there was a light section above the feeder it was satisfactory. Of course, the casting temperature was an important factor in dealing with that casting, and presumably the casting temperature was as low as possible in order to ensure that the metal at the top of the mould would freeze rapidly.

He did not think that atmospheric pressure feeding would be very applicable to malleable foundries, in view of the long freezing range; whilst that did not affect gravitational feeding, it might be found very difficult to force the metal up-hill under atmospheric pressure whilst it was passing through that very pasty condition within the freezing range.

MR. A. E. MCRAE SMITH asked if the author had had experience of using jet type runners on top of the spherical feeding head. He wondered whether it would still be possible to cut down the size of the spherical feeder by running through the feeder itself, particularly through the top of the feeder.

Venting and Permeability

MR. R. C. TUCKER, discussing the change from natural to synthetic sands, mentioned his experience with a 30 per cent. chromium cast iron, which was white and, therefore, had similar foundry characteristics to that used by the author. It had to be cast at a temperature of about 1,430 deg., as estimated by the Schofield pyrometer. He had experienced the same trouble as had the author, that although the synthetic sand could be rammed harder than the naturally-bonded sand and the gases would still get away, the result was some cracked and pulled castings. It was not necessary, for making the small castings, to have green strength of 5 to 7 lbs. per sq. in.; one could make them with green strengths of about 2½ lbs. per sq. in. and save the bentonite.

Referring to a series of tests he had carried out with the A.F.A. tester, with a single vent to within ¼-in. of the face of the test piece, he said that in a mixture of the Mansfield variety, which had a permeability of 18 to 22, with one vent in the 2 in. circle it went up to 25; in the case of a synthetic sand having an A.F.A. number of about 100 to 120, it went up to 150 with a single vent. The fact that the moulds were rammed very much harder in the one case than in the other had had an effect on the strength, but not very much influence on the permeability as shown by the A.F.A. test. It was rather an important point that the effect of the permeability over an area was the same in the synthetic sand unvented and even rammed hard as in a natural sand which had to be vented and rammed fairly soft; there was the same ease of evacuation of gases, or indeed, the evacuation was easier, in the case of the synthetic sand.

MR. E. H. BROWN, referring to the problem of accuracy of dimensions, said he was afraid it was not sufficiently realised generally outside the malleable industry how great were its difficulties as compared with those of other branches of the founding industry. Reference was made in the Paper to three factors which tied up with that. Casting temperature was one; founders in general did not seem to appreciate the differences which the initial casting temperature would make when working to the extreme accuracy of dimensions demanded nowadays for repetition production. Chills had a definite effect; and, even more important, there was the problem of the location of the feeding heads. Although Mr. Webster had referred to the smaller firms as the " back yard foundries," Mr. Brown felt, in view of the large quantities of jobbing malleable castings being made today, that those firms should be referred to almost as the backbone of the industry. He urged that they deserved a lot more assistance than they received on the problem of the location of feeders; in many cases not sufficient assistance had been given by the users to the actual makers of the products.

Far too little inspection was carried out at the average foundry; and even where there was inspection, it was not done by foundry experts. There was very definite need for improvement in that direction. Finally, with regard to core location, in many foundries he had seen the cores being located very accurately by jigs, but in his view still insufficient use was made of jibs and gauges in the actual setting of the cores in the mould; consequently, troubles occurred.

Author's Reply

MR. ROXBURGH, in replying to the discussion, thanked Mr. Webster for his remarks, and said that he was indebted to Mr. Shepherd for having answered Mr. Webster's criticism of the current specification for malleable iron castings and for having brought to the latter's notice the work of the Institute of British Foundrymen and the British Cast Iron Research Association in this connection.

Mr. Roxburgh assured Mr. Shepherd that he appreciated his complimentary remarks concerning the Paper, and took the opportunity of paying tribute to Mr. Shepherd for his valuable contribution to the discussion. Mr. Shepherd's brief review of the position, status and future of the malleable industry had been most interesting. Mr. Shepherd had referred to chills and had mentioned his experience of coating them with shellac and dusting them with fine sand. Mr. Roxburgh said that, although he had not tried this method, he would certainly do so. With the coating he himself used, the oil on the surface of the chill definitely assisted in keeping it in a dry condition, which was an important consideration. As to the formation of primary graphite due to scale or oxide on the chill, Mr. Roxburgh said that he would not use a chill in that condition, but would endeavour to clean it, if possible, by sand-blasting. Failing that, he preferred to replace a chill rather than take risks by its extended use. Regarding the type of bentonite he had used in his initial work with synthetic sand, Mr. Roxburgh indicated that it was a western bentonite. As a matter of interest, he said that recently he had found that the No. 3 Fulbond compound had given even better results than the No. 1 material.

The author, after expressing appreciation of Mr. Shotton's contribution, agreed that the density of ramming had as much effect on the occurrence of "pulls" in castings as had the lower moisture content of the synthetic sand, and mentioned that a great deal of attention had had to be paid to this aspect. With regard to the increase of permeability shown by the backing sand, after continued use, Mr. Roxburgh could only suggest that the strength of the sand had been reduced by the diminution of bond, and also the percentage of coal dust had become less and that these two factors were contributory to this end. Mr. Shotton had referred to the manufacture of the tank hub casting, and he agreed that it was perhaps surprising to find that the top of the flange was sound when joint feeders alone were used. It was quite correct to state that the casting temperature was most important, and that it was necessary to cast at as low a temperature as possible. There was merely a run-off on the top of the flange, and, as a matter of fact, thousands of castings had been made in this manner, and he could guarantee that they were quite sound. Mr. Shotton's opinion in regard to atmospheric pressure feeding as applied to malleable castings had been noted and, although Mr. Roxburgh's experiments in this direction were only in the initial stages, yet, so far, he could only agree.

He had been very interested to hear of Mr. Tucker's experiences with synthetic sand. He had noted particularly the suggestion that, with small castings, the green sand strength could be considerably reduced, and his comments regarding the comparison of the effect of permeability over an area between synthetic sands and natural-bonded sands were of great interest.

Replying to Mr. McRae Smith's question concerning the running of metal direct into the top spherical feeders, Mr. Roxburgh said that, invariably, this was his practice with joint feeders, and, in the Paper, he had mentioned the superiority of "running-feeders" over "off-feeders." He did not, however, run metal into top feeders because he was concerned only with green-sand moulding, and would be afraid that the dropping metal would damage the mould and also affect the actual running of the casting. Nevertheless, it was good practice to fill the top feeder partially, and then make an addition of hot metal to increase the effectiveness of the feeding metal.

He agreed with Mr. Brown that the accuracy of dimensions with malleable castings was a problem, and that the variables which exerted an influence on this matter required particular control. He mentioned that he had stressed particularly in the Paper the importance of first-class tackle and also of inspection. He said that every casting manufactured in his foundry was inspected and, in the Paper, had given illustrations of core gauges used in the coreshops and also gauges for the moulders in the foundries in order to ensure the accuracy required.

WRITTEN DISCUSSION

Patching Synthetic Moulds

MR. J. L. FRANCIS wrote asking the two following questions:—(1) When using synthetic moulding sand, had the author experienced any difficulty in the mending up of moulds done by hand? Machine moulding was a different proposition, because the time taken to ram up and draw the pattern was not very long; moreover, the pattern was drawn by the machine. With hand moulding, the time taken in ramming was longer, and drawing of the pattern often necessitated some patching up of the mould. It has been personal experience that lower moisture content of synthetic sand, combined with the longer time taken to prepare a mould by hand, resulted in drying out of the sand, so that mending up was rendered very difficult, especially on the larger and intricate work, where time taken in ramming and mending up might be considerable. Furthermore, it would be interesting to know whether the moulders who asked for synthetic sand in preference to the natural bonded sand were doing machine or hand moulded work.

(*Concluded on page* 90.)

MOULDING BY THE USE OF OIL-SAND CORES*

By R. D. Cheyne

[Abridged]

Moulding by the use of oil-sand cores is a comparatively old idea, and its introduction probably synchronised with the advent of oil sand itself. Many foundries have probably utilised this method on odd occasions, but very few have developed it to any appreciable extent. It has many outstanding features which are worth considering. After the war, when the restrictions on the use of raw materials are lifted, this method could probably be developed to a much higher standard, and in many instances replace dry-sand moulding, as the following example shows.

The manufacture of rear wheels for agricultural tractors carrying a large low-pressure tyre provides a good example. The wheel being a grey-iron casting, approximately 10 in. deep and 3 ft. 3 in. diameter at its maximum point. The finished casting is shown in Fig. 1, and is sufficiently intricate to make the production of a large quantity a troublesome proposition.

The whole procedure was laid out very carefully in the patternshop, the first step being to split what would normally have been the pattern into suitable core-boxes. Then the amount of tackle, the size of the box-parts, where it was to be run, and the daily production of castings were all taken into consideration.

For moulding a three-part box was used, the top and bottom being identical and possessing straight bars. The centre box, however, was a square frame, with no bars, and the exact depth corresponded with that of the assembled cores. Each box-part possesses machined facings and four lugs drilled and fitted with cotter-pins. The drags were laid out along the foundry floor, and each was rammed with a good dry-sand mixture, strickled, levelled off and finally given a good hard protective facing, such as tar. The drag part is not essential, as a machined perforated cast-iron plate could be substituted. This is equally as good, but involves a little more work on the part of the machine-shop. These boxes are nothing more or less than a flat bed, or foundation, upon which to build, and, once having been placed in position, need not be moved until the order is finally completed.

The job had been split into five suitable core-boxes, each core having been arranged so as to be handled by mechanical means. A straightforward jolt turn-over moulding machine gave quite satisfactory results. The small cores, however, were made by hand.

The bottom core, as shown in Fig. 2, possessing a centre flange, would have necessitated an extra joint or ramming a piece of core over the flange in green-sand moulding. In this case there are two alternatives: either place the centre flange core on the base, and lower the bottom core over it, or gum the flange core into the bottom one during assembly. Actually the former method is faster and gives equally good results. The bottom core possesses a small male dove-

(*Concluded on page* 90.)

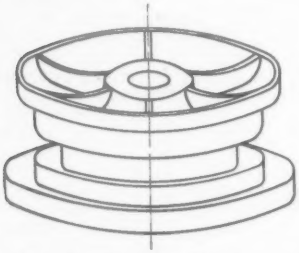

Fig. 1.—Finished Casting of Rear Wheel of Agricultural Tractor.

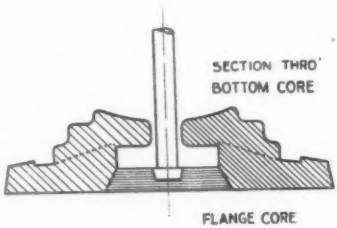

Fig. 2.—Section Through Bottom Core.

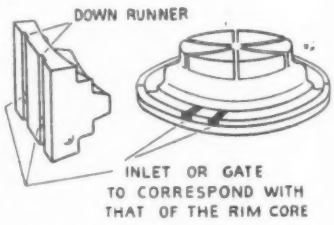

Fig. 3.—Showing Position of Down-Runners and Gates.

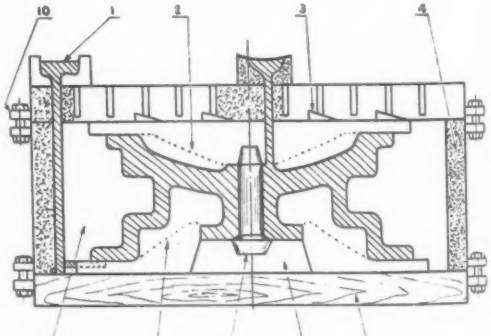

Fig. 4.—Section of Complete Mould Assembly Ready for Pouring.

* Paper awarded second prize in the 1943 Short Paper Competition held by the Scottish Branch of the Institute of British Foundrymen.

INDUSTRY AND EDUCATION

By G. L. HARBACH (Member) and J. R. HORTON (Associate Member)

Discussion of Paper presented at Annual Conference of the Institute of British Foundrymen

At the recent annual conference of the Institute of British Foundrymen in London, the above paper was presented at one of the sessions, at which Mr. David Sharpe, the new president, presided, the subject being of pressing interest to the foundry industry, a very animated discussion followed. A report of this discussion, together with two written contributions and the authors' considered replies to the different speakers, is given below.

MR. S. H. RUSSELL (Past-President of the Institute, chairman of the Institute's Education Committee), opening the discussion, welcomed the Paper as a very valuable contribution, obviously the result of patient thought and careful investigation; much of it, he said, had run parallel with the discussions of the Education Committee of the Institute, and most of the conclusions drawn in the Paper were very sound. Referring to the section of the Paper headed "Past Aspects on Education," he said there was a slight tendency to over-stress the fact that the elementary schools held examinations for children of the age of 11 years in order to sort out those who were suitable to take a secondary education. There was a tendency to conclude from that that the education was designed primarily for secondary school purposes.

With regard to the authors' view that the age of 11 years was too early a stage at which to make a definite decision about segregating children into groups according to their future vocations, Mr. Russell agreed that the problem was difficult; but he believed the educational authorities had agreed that at that first critical stage the decision had to be made, for better or for worse, and it was suggested that there should be some facility later for up-grading or down-grading the children, transferring them to different groups as they developed. The second paragraph, under the heading "Early Education," giving the authors' suggestions concerning the studies of children from the age of 11 onwards, was sound common sense.

Supply of Teachers

Whilst the authors had tackled manfully the problem of the supply of teachers, he did not think they had found a solution; indeed, he doubted that there were an immediate solution. A fundamental problem for all industry in relation to the present education system was that the teacher was in a class apart. He received first the normal academic type of education, and then went to a university; his hours were unusual, he seldom mixed with people outside his own sphere, and he became accustomed to an academic atmosphere, which was disastrous from the point of view of the education and recruitment of young people for industry generally. Mr. Russell believed that that difficulty had become recognised by the Board of Education and the educational authorities generally, but he did not know whether or not they had found the solution of the problem. A good schoolmaster was not trained in two or three or five years; one could not expect him to mature at much earlier than 35 years of age.

Commending the authors' comments and recommendations for overcoming the natural objection to leaving work with the evidence of one's job still upon one's person, he said that perhaps the most striking recommendation was that the marked segregation between staff and operatives should be discouraged. It was always puzzling that the clerical staff should have certain privileges which did not apply to the works' staff. For instance, the clerks enjoyed a fortnight's holiday; but it seemed that the foremen should enjoy that privilege before giving it to the clerks.

Speaking from his own personal experience, and not on behalf of the Education Committee of the Institute, Mr. Russell expressed the view, though he was open to conviction or persuasion, that vocational training in a school was a mistake at any age. He was not referring to the technical schools, but to the part-time schools. Ultimately the aim was for a boy to leave school at the age of 16 years, and then to attend part-time classes two or three times per week for another two or three years. Mr. Russell did not think that boys could be taught close details of the coal-mining industry, etc., at such classes; if of good education, they could learn those things quite well later. Finally, Mr. Russell assured the authors that their Paper would be considered very carefully by the Education Committee.

Educational Ideals

MR. E. H. BROWN urged that the time was overdue to ensure that every child, during his or her last few years at school, should have the opportunity to hear addresses from prominent industrialists who were really competent to discuss the interesting aspects about those industries. Just before the war he had made such arrangements, through the good offices of an enterprising headmaster, but the outbreak of war had frustrated the scheme. His object had been to try to attract suitable recruits to the foundry industry.

With regard to education in general, he recalled that his headmaster, who had been for a number of years the President of the Headmasters' Conference, had often impressed upon the boys at school, and the old boys, his idea of the major difference between elementary and secondary education. It was that elementary education set out to give the facts, whereas secondary education set out only to teach a student

Industry and Education

how to learn, thus ensuring he would later acquire with facility the specialised knowledge which he would require in the course of his career.

The Financial Incentive

MR. J. BLAKISTON did not think the foundry industry in general realised the condition that was arising with regard to recruitment. In almost every foundry the good operatives were men more than 45 years old, and there were very few young men. The only way in which to attract new recruits to the industry was to provide a financial incentive; although that sounded rather crude, it was a fact which must be faced. Although the foundry trade was paid slightly higher than some of the other engineering trades, either it was not paid sufficiently highly or it was conducted under conditions so unattractive that they turned people away from it before they realised its advantages—and the foundry trade had many advantages because it was adaptable. It was able to cope with many situations. When the basic industries were busy, the luxury trades were sometimes slack, and sometimes the luxury trades were busy and the basic industries were slack. The foundry catered for both.

It was rather disappointing that no reference was made by Mr. Harbach and Mr. Horton to an excellent Paper read by Dr. Douglas H. Ingall at the Middlesbrough Conference of the Institute in 1930, in which he had described a foundry apprentice training scheme of considerable extent which he had put into practice. Mr. Blakiston said he believed that that scheme was still in operation, and that the industry was indebted to Dr. Ingall for a large number of excellent recruits in foundries scattered all over the country.

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MR. J. C. CHARLTON expressed his appreciation of the authors' excellent work, and pointed out that a new Education Bill was to be introduced in Parliament soon and he asked what steps it was proposed to take to bring into operation any scheme the industry or the Institute might prefer. The numbers and quality of foundry apprentices were lamentably low at the present time and something should be done to attract more and better boys to the foundry trade. Education was one way to improve the boys before and after entry into the foundries and conditions generally could be improved. How was it possible to translate ideas into practical politics? He hoped the Education Committee of the Institute would know how to help in that direction.

The PRESIDENT said the Education Committee had spent about 3½ hours on the previous day discussing the problem which Mr. Charlton had expressed so concisely. They were exploring every avenue, and any help which members of the Institute could give to the Education Committee would be welcomed. If any members had suggestions to make as to how to approach the various authorities, he would be glad if they would communicate those suggestions to the chairman of the Committee.

Employer Collaboration

MR. RUSSELL said that there was one very promising avenue of approach through the Council of Foundry Associations. The Council was setting up an Education Committee, and was trying to secure the services of a chairman who was not necessarily closely connected with the foundry industry, but who might have more influence in the appropriate quarters than a foundryman might have. The I.B.F. was represented in the C.F.A. and, when the new Committee functioned, the approach would be made direct to the Board of Education. The avenue of approach through the trades unions had not yet been explored.

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MR. W. T. HODGKINSON drew attention to the point that sometimes the recruits to the foundry industry were of poor quality simply because they had entered the industry by reason of their inability to get other jobs. Some had started to train for electrical and mechanical engineering, and so on; and when they could not find jobs in such industries, they accepted any job they could get. Thus, their training had to be switched over. Endorsing the view that prospects of good pay were necessary in order to attract recruits to any industry, Mr. Hodgkinson complained that the trouble in the engineering industry had been due to the fact that at about the year 1930 the skilled mechanic had received only £2 12s. per week, whereas local authorities were paying £3 per week for road-sweepers.

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MR. M. SEAMAN (Newton Chambers & Company, Limited) said that his company had considered very closely the problems of education and recruitment. He did not think the foundries ought to consider the education problem purely from the point of view of foundries, but rather as part of the whole business of engineering. For some years he had been closely concerned with the electrical and mechanical sides of engineering, and consideration had been given to the interests and problems of the young men at every stage, right up to the final executive positions. In his discussions with foundrymen he had found that many were considering merely the entry of young men to the foundry as moulders or coremakers, or as operatives in some other capacity on the foundry floor; then they were worried because boys preferred the cleaner trades, such as electrical and mechanical engineering.

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there; a boy should be shown the whole picture—which was a very good one—so that he would appreciate the real need for sound scientific and practical men in the industry. That should be the line of approach.

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It was interesting to note that, particularly in the foundry industry, very few of those who had experienced the rigours of the foundry apprentice, encouraged their own sons to follow their trade. This was not as it should be; for was it not a strong trait in British national character that son should follow father in trade or profession? Moreover, did not the fathers have some pride in knowing that their sons were carrying on their vocation?

Again, was not the father able, when a son was following the same calling, to supplement the lad's training from his own experience, personal interest, coaching, etc., which in so many cases produced a higher degree of skill in the son which ultimately benefited the industry? This somewhat unhappy state of affairs might to some extent be due to the son desiring more congenial work, and the father knowing from his own experiences that he would have chosen another calling, had he his time over again.

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It was necessary that those interested should put forward their schemes and suggestions now (for many they will be), so that a governing body be set up to determine a definite principle for instruction. Much useful work had been done by the various education authorities, founding firms, and institutions, including the Institute of British Foundrymen, to advance the scientific and technical training of founding personnel. Many of the technical colleges throughout the country had introduced classes in foundry science and practice, the students being prepared for the City and Guilds examination.

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stitute of British Foundrymen, with which the City and Guilds of London Institute co-operates, formed a very sound basis for the training of future foundrymen. Nevertheless it was the education and training which the boy received prior to entering industry that chiefly concerned those interested at the present time.

Junior technical schools were suggested for post-war planning, and, providing the school-leaving age was raised to 15, there was no reason whatever why a boy should not receive between the ages of 13 and 15 a course of instruction in foundry science and practice, at one of these such schools. The training should be descriptive wherever possible, augmented by works' visits; also that foundry executives visited the schools and gave the students the benefit of years of experience, by talks and practical examples, to assist them in becoming first-class craftsmen; and the more successful ones to go forward to fill the higher positions in the industry.

The fact that only a very limited number would attain the final goal of the finishing school applied equally to all other sections of industry. The effort was efficiency in all grades of foundry personnel in whatever capacity employed. That many non-foundry trained people were placed in charge of foundries only proved the greater need for technical training of those entering the industry, so that those who served might have an opportunity to lead or govern.

The need for improving foundry conditions generally was apparent to all, and sustained effort must be made to effectively achieve this end.

Authors' Written Reply

MR. G. L. HARBACH, on behalf of both authors, wrote that Mr. Russell had stated that 5 years was insufficient to train a good schoolmaster, and they agreed that the necessary blend of tact, justice, psychological ability, even temper and knowledge, which went to make a good schoolmaster could not be instilled in such a short period. They felt, however, that there must be available in industry many thousands of administratives and executives, already possessing these qualities, who, if not already efficient spare-time teachers, only needed a short course to develop confidence in their ability to impart knowledge.

Mr. Russell's personal antipathy to vocational training in schools was heartily reciprocated, if, by vocational it would be assumed he referred to specialisation in a specified trade. It was stated in the Paper that the aim was not to turn out a fully-fledged entrant into industry, but rather someone whose brain and body had received training to prepare them for the change from school to industry.

It was agreed that the financial incentive as suggested by Mr. Blakiston would make an immediate appeal, but the survival of a healthy industry cannot rest entirely on this, at least, not while men still possessed a measure of self-respect and the opportunity to earn equal money in more congenial surroundings. The authors had referred to Dr. Ingall's Paper, and particularly agreed with his remarks on the necessity for close co-operation between industry and the Technical Colleges. His good work in connection with the Constantine College was well known in the foundry world, and the scheme, as now in operation, was well worthy of consideration when formulating plans for the future.

The authors thanked Mr. Charlton for the very pertinent query raised in his remarks. Discussion of how to encourage action on the subject of the Paper was omitted because the authors considered that this, probably the most difficult task, was a question requiring the consideration of a qualified body of opinion, such as the Institute's Education Committee.

In their rough analysis of any proposed educational reform the authors endeavoured to point out the necessity to avoid considering the question from the foundry viewpoint alone, as was suggested by Mr. Seaman. As to glamourising the industry, the authors fully agree, always with the proviso that in using the word "glamour," there was no intention to falsely depict certain aspects of the industry in order to gain advertisement value. Co-operation with the internal organisations of different firms already tackling the problem would undoubtedly help to establish any reforms on a national basis, and ensure that the industry progresses as a whole irrespective of individual improvements.

That foundry personnel should discourage their own sons from following them, emphasises the present unhealthy state of the foundry trade. The disappearance of this tendency will not only materially aid the industry to produce better craftsmen as indicated by Mr. Coates, but will also be one of the first signs that the present problem is approaching a satisfactory solution. Technical training should be given during working hours, and the authors understood that the Minister of Education intended to make such part-time systems a compulsory measure.

Mr. Kelly stressed the importance of making any attempts at vocational instruction as descriptive as possible, with works visits and members of industry to give lectures. This would retain interest, encourage enthusiasm, and at the same time provide a direct appeal to the leanings or preferences a boy may have towards any particular trade.

In conclusion, the authors of the Paper wished to express their thanks for the appreciation and interest shown by members of the Institute in the written and verbal discussion.

Alloys of Magnesium.—The constitution of the magnesium-rich alloys of magnesium and manganese has been re-determined, and a diagram, which differs appreciably from those of previous workers, is given in another part (XIV) of the series of Papers on the "Alloys of Magnesium," published by the Institute of Metals. In this Paper, J. D. Grogan and J. L. Haughton show that the phase which separates from the liquid when more than about 2 per cent. of manganese is present is alpha-manganese.

American Metallurgical Scene—14

AMERICAN FOUNDRY PROBLEMS

Man-power shortage in the foundry industry is becoming increasingly acute—preventing capacity operations in many instances, report "Steel." This is particularly true among the steelfoundries and to a lesser extent among the non-ferrous, malleable and grey-iron shops in the order named. Loss of men to the Armed Services and to higher paying jobs, requiring less manual work, have combined to create a serious man-power shortage in the industry.

Normally, foundry interests have attempted to fill their labour needs from the areas in which they operated, but in the past year they have been forced to obtain men from other localities, notably the south. Because of the character of operations, most American foundries have not been able to adapt themselves to employment of women as easily as other industries. However, in some foundries women represent as much as 30 per cent. of the total number of employees and employment of women is increasing.

Women are serving in the industry as inspectors, laboratory helpers, sand mill operators, core workers, acetylene cutters, welders, electric and gasoline industrial truck operators, oilers, crane operators and oven tenders. Job turnover in foundries is very high, notably among unskilled employees. To prevent the constant loss of men to machine shops and other plants on war work, industry officials have been doing everything possible to make foundry work more attractive, safe and healthful.

Increased production of castings since the outbreak of the war has largely been achieved through fuller use of existing facilities and improved material handling systems. Steelfoundries were the only foundry group to find it necessary to increase sharply operating facilities to meet the unprecedented war demand.

An indication of the sharp increase in the production of steel castings is illustrated by the following figures, which include an estimate of the tonnage produced by "captive" foundries. On this basis output in 1933 is estimated at 390,000 tons; 1939, at 830,000; 1941, at 1,800,000; while the War Production Board estimated 1942 output at 2,339,000 tons and set a goal of 3,154,000 tons for this year.

June output of steelfoundries was only at about 85 per cent. of capacity, due primarily to man-power shortage. Officials state one of the biggest problems the industry faces is that of manning new plants.

Employment trend in the steelfoundry group has risen steadily, along with increased output and expanded capacity. For the commercial steelfoundries employment was estimated at 25,500 in 1934, 30,000 for 1939, and rose further to 35,000 by the close of 1940. In June employment for this group was near 100,000, against 70,000 a year previously. If the employees of the attached steelfoundries engaged in war production are included, an additional increase of 40 per cent. for the war years should be made.

Malleable foundries were said to be operating at about 90 per cent. of capacity, off slightly from the close of last year. The production capacity for malleable-iron castings is estimated at 1,200,000 tons annually, generally unchanged from prior to the war. Output totalled 947,000 tons in 1929, 632,000 in 1940 and 972,000 tons in 1941. Production in 1942 was off 5 per cent. to 930,000 tons.

In July order backlogs averaged three months for malleable-iron castings, with orders increasing and production barely holding its own. Employment in June was about 38,000, against a peak of 43,000 in 1929 and a low of 22,000 in 1932.

MAGNESIUM CASTINGS

American production of magnesium castings running at around 2,500 tons per month since January, has reached a rate three times as great as at the time of the Pearl Harbour attack, states the War Production Board. Incendiary bomb magnesium castings are not included in the totals. Sand castings experienced the largest increase in weight—from less than 750 short tons in November, 1941, to over 2,250 tons per month in the spring of this year. All but an insignificant portion of this product is heat-treated for increased strength and is used in landing gear, engine, and other aircraft parts. A decline in production in May and June was attributed to several factors, one of the most important being rigid enforcement of the aircraft directive restricting peening, welding, and other established foundry practices.

Both gravity and ordinary die-castings showed very large percentage gains since the beginning of the war, although in terms of weight the increases were small compared to that of sand castings. Gravity die-castings reached a peak of 178 tons and die-castings a peak of 137 tons in May of this year, increases of more than 1,400 and 400 per cent. respectively over pre-war production.

The Board points out that much of the expansion in magnesium castings production was carried on by companies new in the field whose previous experience had been in other metals, notably grey iron and Al.

The Great Lakes ore fleet has now reached an **all-time high record of 305 ships, with a carrying capacity of 2,803,090 gross tons.**

American iron-ore consumption during 1942 reached a record of 86,225,460 gross tons, according to the Lake Superior Iron Ore Association. Consumption in 1942 is an increase of 12.9 per cent. over the 1941 previous record of 76,335,682 tons and an increase of 35.4 per cent. over consumption in 1929, which was the peak year until 1941. On January 1, 184 out of 191 blast furnaces were active. This compared with 176 out of 189 a year before. At the beginning of 1943, 47,424,421 tons of ore were on hand at furnaces and Erie docks, as against 40,456,893 tons a year ago. The supply on hand, based on rate of consumption in December, was sufficient for 6.1 months.

MOULDING BY THE USE OF OIL-SAND CORES

(*Concluded from page* 84.)

tail projection on the rim opposite one rib of the casting. Having placed the bottom core in position on the base, the rim cores are built on, commencing with the segment possessing the corresponding female dovetail with that on the bottom core. These segmental rim cores—eight to the circle—were made with flat backs. This facilitates the coremaking, and their adaptation to the moulding machine. The core is merely jolted, turned over and stripped into a flat plate. They sit half on the bottom core and half on the base and, when assembled, form an octagon. The rim cores form on their top inside edge a circular ledge upon which the top core sits. The ribs in the top core are made to correspond with those in the bottom by a similar dovetail piece as mentioned previously.

This completes the assembly of the cores except for the running of the casting. Two of the rim cores had a down-runner located at the back of the core, and a small gate through the joining to a small inlet in the bottom core, as is shown in Fig. 3.

This made four spray inlets which proved adequate to keep a steady flow of good hot metal without involving any danger of choking. To allow the down runners to be blacked and made perfectly clean they were left open and a small piece of flat core was gummed over the back after blacking.

When all the cores are assembled on the box, the centre box is lowered in position. This gives a clearance of approximately 2 inches round the back of the octagon. Ordinary green sand is rammed down the back, ensuring that all cores are tightened into position. The top box is placed in position, and all the boxes are cottered or bolted. Small wedges are driven below the top box bars, no weights being necessary to hold the cores down. It is not necessary to ram the top box, the wedges being adequate, and the only points needing ramming are the continuation of the down runner and risers. The runners and risers are then bushed in the usual manner, and the mould is ready for pouring as shown in Fig. 4.

If the patternmaker has provided an accurate job the assembly is simplicity itself, and almost fool-proof. The percentage of foundry scrap in this case out of the first 1,000 castings was lower than 0.02 per cent.

Micro-chemical Analysis in Steelworks

A general practical survey of the applications of micro-chemical analysis in steelworks laboratories is given by J. MIKA in "Stahl und Eisen" of December 3 last. One of the conclusions drawn by the author is that micro-chemical analysis, when rationally applied, can be fully as accurate and reliable as other more standard methods, and at the same time gives a considerable saving in chemicals. Mika published a book on exact methods in micro volumetric analysis in 1939.

SOME ASPECTS OF THE PRODUCTION OF MALLEABLE IRON CASTINGS

(*Concluded from page* 83.)

(2) Did the author use any dressing on his cores? Presumably he used none on the moulds, since they were cast green and coal dust was incorporated in the sand.

MR. ROXBURGH pointed out that all the moulding carried out in his foundry was with green sand and that synthetic sand had only been used for machine moulding. Probably Mr. Francis would agree that it was not an economical proposition to patch a mould produced from a moulding machine, and that it was cheaper to knock the mould out and make another. He agreed that, with hand moulding, patching-up did present difficulties and was usually effected by wetting the damaged part of the mould and by subsequent sprigging. In order to avoid or reduce the drying out of synthetic sand, it was customary to add a small percentage of oil, which had been found advantageous.

In the main, no dressing was used on any of the cores, except in some special cases where it had been found necessary to black them with a mixture of wet blacking and plumbago. For example, the cores used in the manufacture of the 3-in. bombs, illustrated in the Paper, were treated in this manner. There was, however, no dressing used on the moulds, as they were cast green, the sand incorporating coal dust.

NEW PUBLICATIONS

Training New Entrants to Industrial Work. A Manual for Employers. Issued by the Ministry of Labour and National Service.

This excellent booklet is about three or four years overdue; yet since the Ministry has now trained over a quarter of a million of entrants to industry, there is at least a wealth of experience to be drawn upon. The dearth of skilled workers is put forward as the reason for extending the training schemes to embrace the individual works. The objects of the booklet are (1) to afford guidance to employers faced with the problem of training new staffs, and (2) to describe the help which the Ministry can give to employers who wish to introduce arrangements for training or to develop their existing training arrangements. There is also an ancillary scheme for training employees with the object of training them for higher grade work. Details of these schemes can be obtained from the local Employment Exchange or District Manpower Office, where the booklet, P.L. 128/1943, is available on request.

Mould Drying Stoves. — Foundry Refractories, Limited, 9, Midland Road, Wellingborough, have sent us a cyclostyled pamphlet illustrated by a line drawing of a self-contained drying stove heating unit. This burns the lowest grades of fuel and incorporates a system of convection heating. The unit, a range of which is available, can be attached to existing stoves.

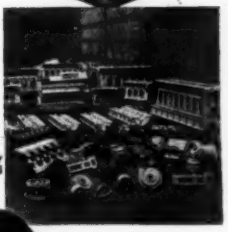
STANTON DALE

Refined PIG IRON

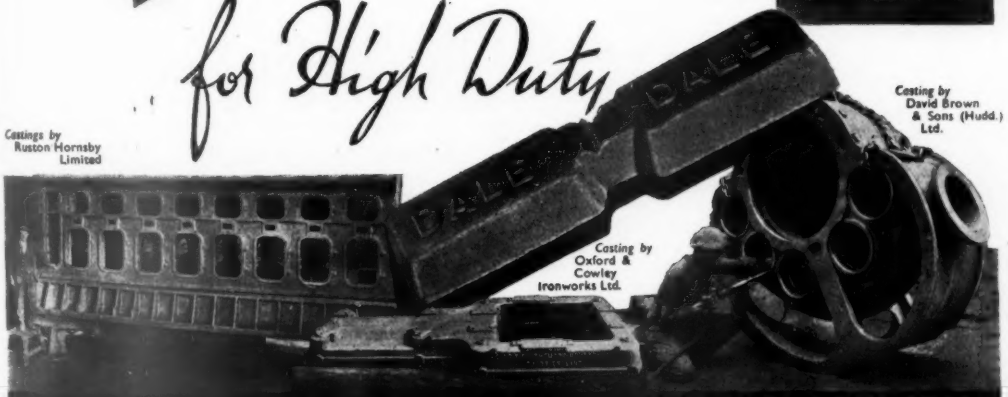
for High Duty

Castings by Morris Motors Limited.

Casting by Baker Perkins Limited



Castings by Ruston Hornsby Limited



Castings by Ruston Hornsby Limited

Casting by David Brown & Sons (Hudd.) Ltd.

Casting by Oxford & Cowley Ironworks Ltd.

THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM.

NEWS IN BRIEF

A DONATION of £5,000 has been given by Imperial Chemical Industries, Limited, to the Oxford University appeal for £250,000 to found a department of ophthalmic research.

SHAREHOLDERS of the Armstrong Whitworth Securities Company, Limited, at a meeting held on September 16, approved by overwhelming majorities the voluntary liquidation of the company and the appointment of Mr. J. Hawson as liquidator.

NO FEWER than 848 railway sidings, 30 bridges, 68 engine turntables and six disused stations are being demolished by the L.M.S. Railway and the materials used elsewhere. Altogether, these demolitions will provide 22,000 tons of iron and steel, 5,600 tons of timber, and 5,000 tons of bricks.

A NORTH-EAST COAST shipyard is at present completing the first of a series of large and fast cargo ships of standard design. These ships have a deadweight capacity of 12,000 tons. The hull is riveted throughout, but the deck houses are welded, and have been built in large sections, preassembled. The machinery is a standard type of double reduction geared turbine.

LORD RIVERDALE opened at Fargate House, Sheffield, recently, an exhibition dealing with works relations, in which seven Government Departments have co-operated, and which has been organised by the Industrial Publicity Committee of the West and East Ridings Regional Production Board. It is a permanent exhibition, designed to assist managements and workers in organising in works and factories schemes which will promote interest in production tasks, and have the effect of clearly identifying every worker's job directly with the war effort.

REPRESENTATIVES of all the large aircraft factories of the country attended a meeting in London last week at which Sir Stafford Cripps, Minister of Aircraft Production, made a frank disclosure of the great scale of aircraft production and the programme awaiting completion and answered a variety of questions. There were two men from each factory, one representing the management, and the other the workpeople. They will take back to the factories the information which Sir Stafford Cripps gave and the significance that attaches to it; but the information cannot yet be published.

FOR SOME TIME PAST the Brush Electrical Engineering Company, Limited, of Loughborough, has had under review the education and training of its young employees, and has now decided to give immediate effect to the recommendations for continuative education of young persons in industry contained in the Government White Paper. A comprehensive programme has been worked out in collaboration with Loughborough College, and by means of courses in the Works School, and at the College, continuative education amounting to approximately one day a week is being introduced for all girls and boys below the age of 18. Selected young persons over the age of 18 will also be given advanced education.

NATIONAL BRASSFOUNDRY ASSOCIATION

BRASSFOUNDERS' EMPLOYERS' CHANGE OF TITLE

At its meeting on September 21, the Brassfounders' Employers' Association changed its title to National Brassfoundry Association. This step has been necessitated by the rapid development of the character of the association's work in recent years, in the directions both of membership and activity.

The association was originally formed as the Brass Masters' Association in 1906, a development in turn by the amalgamation of the Chandelier and Gas Fittings Manufacturers' Associations, of which records are shown to have been in existence since 1875. Out of this there developed the Brass Trade Manufacturers' Council, of whom we hear in 1897, which had embraced the Chendelier and Gas Fittings Manufacturers' Association, an informal group of Cabinet Brassfounders, the London Brass Manufacturers' Association and others whose earlier history is obscure.

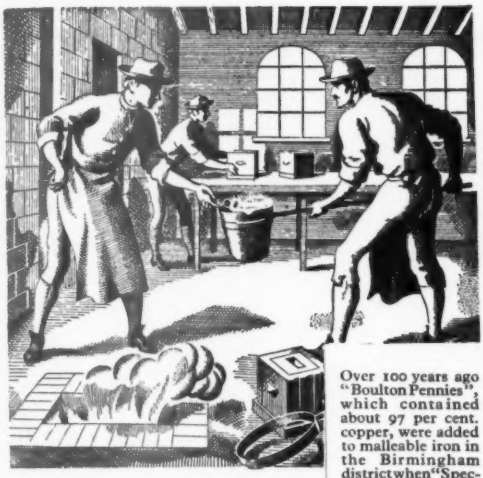
It was not until 1918 that the title of Brassfounders' Employers' Association was adopted. At that time, and until quite recently, the membership was for the most part limited to the Birmingham, Wolverhampton and Black Country area, in which the industry is generally located. At the same time the activities of the Association were almost entirely limited to wage negotiations.

In the period between the two wars the Association has slowly developed its activities on the economic side of association work, which process has been considerably accelerated as a result of the present war. So much so that, while still dealing with wages matters in the Midlands, the Association now provides an extensive service in other fields to a membership which extends to all parts of the country, and branches have been established in other important centres of the industry.

At last week's meeting a cheque for 400 guineas was handed by the Association to the Lord Mayor of Birmingham on behalf of the City's R.A.F. Benevolent Fund.

AMERICAN SLAG PRODUCTION

The total output of air-cooled screened and unscreened, and water granulated slag for 1942 in the United States, was 19,122,718 short tons, as compared to 14,678,266 tons for 1941, states the National Slag Association. The air-cooled slag was used principally in the construction and maintenance of highways, access roads, airport runways, defence plant and housing projects, miscellaneous structures, and as railroad ballast and sewage trickle filter media. During the process of crushing and screening blast furnace slag, particles of metallic iron which escape through the slag notch of the blast furnace are recoverd at the slag plant by means of hand-picking and magnetic pulleys. During 1942 the 31 companies surveyed reported 165,679 tons of metallic iron recovered and returned to the furnaces.



Over 100 years ago "Boulton Pennies" which contained about 97 per cent. copper, were added to malleable iron in the Birmingham district when "Specially good metal was required".

COPPER

The metal that is associated with all progress

From the dawn of civilisation there has never been an era in which copper has not contributed an important part to the welfare and progress of mankind. This is as true to-day as it was in the Bronze Age, but copper alloys and the applications of copper are now so numerous that a wise choice for each and every application is no easy matter.

If you have this difficulty or any other arising from the use of copper you should not hesitate to consult the Copper Development Association. The Association's advisory service is available to you free of charge.

COPPER DEVELOPMENT ASSOCIATION

A non-trading organization maintained by the British Copper Industry to supply information and advice, free, to all users of copper.

Grand Buildings, Trafalgar Square, London, W.C.2
and 9 Bilton Road, Rugby
Telephone: only Rugby 2369 C13

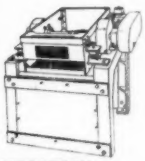
THIS HOPPER ACTS AS PRE-HEATER

"POLFORD"
TILTING FURNACE

Saves Fuel
Saves Time
—Gives Longer Life to Crucibles

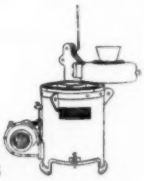
For melting non-ferrous metals, this unit has been designed for rapid fusing, mobility, flexibility of control and low fuel consumption. Made in various sizes for crucibles of 100 lbs. to 1200 lbs. capacity; coke, oil or gas firing. The metal is pre-heated before entering crucible. Fitted with Drop Bottom, operated instantaneously in emergency. Write for prices and full details.

May be used as either a Fixed Type Crucible Furnace or as a Tilter.



VIBRATORY SCREENS

Other **"POLFORD"** *Products*



CRUCIBLE FURNACES

CORE SAND MIXERS

THE HEATON FOUNDRY CO. LTD.
Makers of Foundry Equipment,
HEATON JUNCTION, NEWCASTLE UPON TYNE, 6.

COMPANY RESULTS

(Figures for previous year in brackets)

Vickers—Interim dividend of 4% (same) on the ordinary stock.

Paterson Engineering—Dividend of 10%, plus a bonus of 2½% (same).

Imperial Chemical Industries—Interim dividend of 3% on the ordinary stock (same).

Villiers Engineering—Net profit to July 31 last, £33,036 (£34,669); dividend of 10% (same).

Horseley Bridge & Thomas Piggott—Dividend of 15% on the ordinary shares for the year ended June 30 (12½%).

Bromilow & Edwards—Net profit to March 31 last, £10,329 (£19,119); dividend of 10% (same) and a bonus of 2½% (same).

Darlington & Simpson Rolling Mills—Dividends on the 5½% first and 6% second cumulative preference shares for the half year to September 30.

Pearson & Knowles Coal & Iron—A payment in respect of profits to June 30 last of 5%, less tax, on the income debenture stock will be made on October 1 (2½%).

Qualcast—Trading profit to June 30 last, £162,395 (£159,787); final dividend of 10%, and a cash bonus of 10%, making 30% (same); forward, £35,066 (£30,262).

Birmid Industries—Profit to October 31, £118,920 (£119,620); dividend of 10% (same), plus 7½% bonus (same); to reserve, £75,000 (£50,000); forward, £40,179 (£56,196).

Aluminium Corporation—Profit for 1942, after providing for depreciation and E.P.T., £51,186 (£45,575); loan interest, £4,000 (same); interest on 7% income debentures for the years 1937 to 1940, inclusive, £21,000 net (£10,500 gross); income-tax, £26,700 (£25,250); forward £6,591 (£9,505).

Braithwaite & Company Engineers—Net profit for the year to March 31 last, including a dividend from Braithwaite & Company (India), Limited, and after providing for the estimated liability for all taxes, £19,860 (£19,674); final dividend of 3½% on the ordinary shares, making 6% (5%); forward, £34,361 (£30,956).

Sheepbridge Coal & Iron—Profit for year to June 30, after all charges, £159,566 (£155,929); final preference and ordinary dividend of 5%, making 8% (same), free of tax; to reserves for renewals, deferred repairs, and war damage contributions, £20,000 (£35,000); to reserve fund, £20,000 (nil); forward, £120,096 (£118,320).

Staveley Coal & Iron—Profit for the year ended June 30 last, including dividends from investments, £967,917 (£949,745); written-off stock values, £90,000; war damage insurance, £7,637; taxation, £375,350; depreciation, £210,718; fees, £11,000; net profit, £273,211 (£271,635); interim dividend of 2½%, free of tax, £84,634; to general reserve, £50,000; final dividend of 4%, free of tax, making 6½%, free of tax (same), £135,414; forward, £138,629 (£135,466).

EIRE FOUNDRY'S DIFFICULTIES

The company was formed in 1936 and, after six years' trading, it had an adverse balance of £39,493, said Mr. G. A. Nolan, solicitor, when, on behalf of the employers, he opposed an application for a maximum bonus of 8s. a week to some 200 employees of Allied Ironfounders (Ireland), Limited, heard before the Wages Tribunal at Waterford. But for the consideration of the debenture holders they would now be closed down. An increase of the kind applied for would be disastrous. The company started in Waterford, where the foundry business was practically unknown—they had to start off a new industry and train raw recruits, and, as these improved in efficiency, the company made some little progress. They paid an efficiency bonus and, in February, 1940, granted bonuses to the employees.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Northern Machinery Supplies, 57, Albert Road, Middlesbrough—£2,000. W. S. Adams and N. E. Copling.

James Garside & Son, Wakefield Road, Copley, Halifax—Millwrights, engineers, etc. £5,000. J. T., D., and E. Garside.

Linton & Hirst, 24, Alexander Gardens, Muswell Hill, London, N.10—Founders, toolmakers, etc. £1,000. C. F. Linton and H. Hirst.

Modern Industries (London), 15, Copthall Avenue, London, E.C.2—Mechanical, electrical and general engineers, metal workers, etc. £1,000. W. G. Hawkins and H. S. Viney.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

555,344 BRITISH THOMSON-HOUSTON COMPANY, LIMITED, BOURNE, H. K., and BEESON, E. J. G. Method of forming hollow metal bodies.

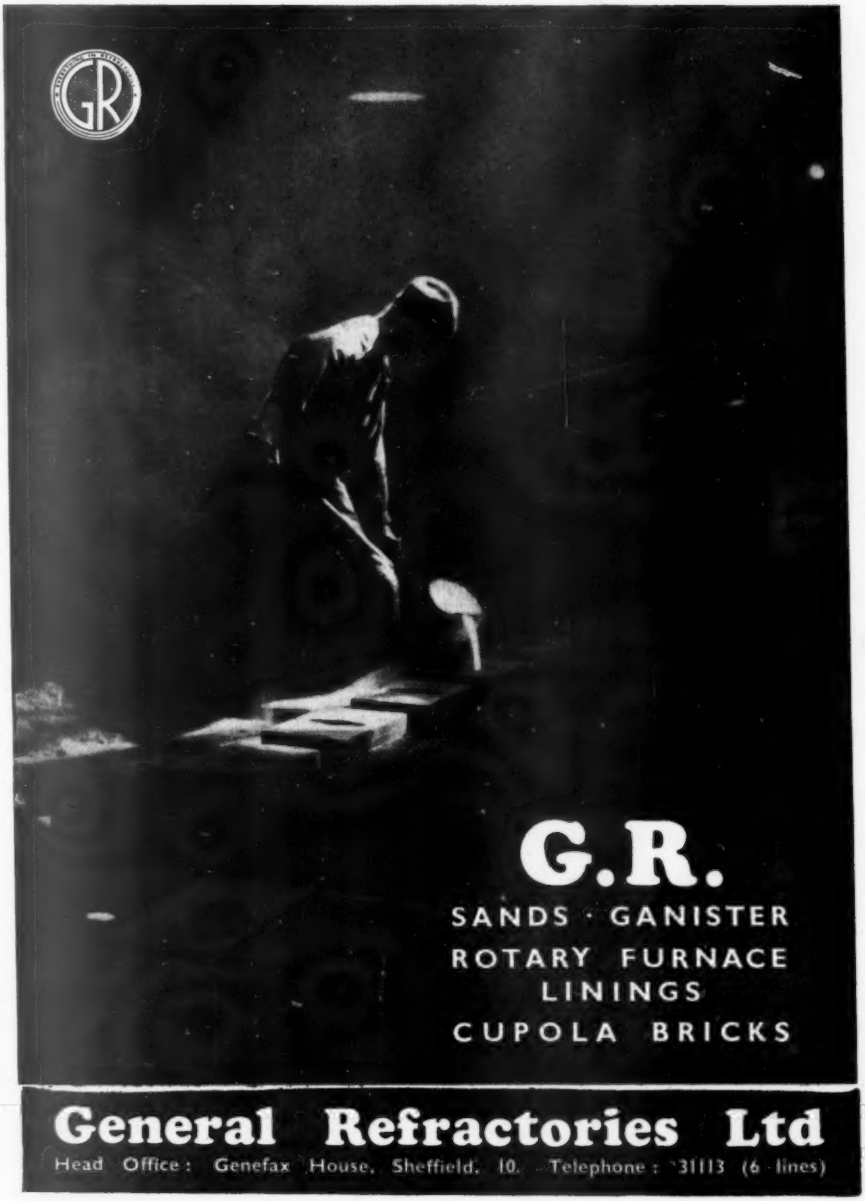
555,412 MAGNESIUM ELEKTRON, LIMITED, SIMCOX, H. J., FISHER, P. A., and HIRST, S. B. Recovery of magnesium and magnesium base alloys from scrap.

555,425 MAGNAL PRODUCTS, LIMITED., ALLEN, F. A., MORGAN, J., and BRACE, A. W. Aluminium alloys.

555,437 FORD MOTOR COMPANY, LIMITED. Method of centrifugally casting steel articles and articles produced by such method.

555,438 STEIN & ATKINSON, LIMITED. (General Properties Company, Inc.). Furnaces.

555,457 SHELL DEVELOPMENT COMPANY. Corrosion inhibition coating and application thereof.


G.R.
SANDS · GANISTER
ROTARY FURNACE
LININGS
CUPOLA BRICKS
General Refractories Ltd
Head Office: Genefax House, Sheffield, 10. Telephone: 31113 (6 lines)

OBITUARY

MR. HARRY WHEALE, who had been associated with Moorwoods, Limited, of Sheffield, for over 50 years, died recently.

MR. H. POWELL, chief chemist and metallurgist to the Associated Equipment Company, Limited, died on September 15.

MR. JAMES DALGLEISH THOMSON, a partner in the West End Engine Works Company, Edinburgh, died on September 14.

MR. TOM BISSELL, a director of the Birmingham firm of Crawley Parsons & Company, Limited, metal merchants, died on September 16, in his 75th year.

MR. FREDERICK MANDLEY BAILEY, managing director of Sir W. H. Bailey & Company, Limited, engineers, Albion Works and Ellesmere Foundry, Patricroft, Lancashire, died recently. Mr. Bailey was the last surviving son of Sir W. H. Bailey, and a grandson of the founder of the firm, which was established in 1839. He was widely known amongst Manchester and district engineers.

MR. JAMES STANLEY ATKINSON, managing director and founder of Stein & Atkinson, Limited, the well-known furnace constructors and combustion engineers, died suddenly on Saturday, September 18. Mr. Atkinson, who was 61 years of age, had been intimately connected with the iron and steel industry for many years. He founded the firm of Stein & Atkinson in 1915. He was previously with the Wellman Company in charge of their Continental business, and while with them met Mr. Stein in France, and began an association which resulted in the formation of Stein & Atkinson. He contributed numerous papers to the transactions of the technical institutions, and had a wide circle of friends. He was a member of the Institution of Mechanical Engineers and of the Iron and Steel Institute, his membership of the latter body dating back to 1913, a Fellow of the Institute of Fuel, and a member of the Society of Glass Technologists.

MR. ALFRED SMALLWOOD died at his home at Handsworth on September 14, at the age of 89. He had wide and varied metallurgical and industrial interests, and many friends and associates in this country and abroad. His introduction to the metal trade began in Birmingham at the age of twelve. Despite long hours and extreme physical effort, he acquired a sound technical education, and in early manhood had proprietary interests in the non-ferrous casting and seamless steel tube trades. He did much pioneer work in the manufacture of bearing metals and phosphor copper, and in the early part of this century founded the Incandescent Heat Company, Limited, industrial furnace manufacturers, also Buckley's Limited, seamless steel tube manufacturers, and, more latterly, Boulton Tubular Structures, Limited, Selas Gas & Engineering Company, Limited, Manchester, Controlled Heat and Air, Limited, Smethwick, and other engineering companies, in which he maintained active directorships. He had many and diverse interests both at home and abroad, and had travelled extensively. He supported many important researches.

PERSONAL

MR. W. L. JAMES, general works manager at Workington for the United Steel Companies, Limited, since 1933, is leaving to take an appointment with John Summers & Sons, Limited, at Shotton, Cheshire.

SIR MAURICE DENNY, BT., chairman of William Denny & Brothers, Limited, Dumbarton, has accepted the invitation of the council to become president of the Junior Institution of Engineers for the 1943-44 session.

MR. LEONARD GRANT has been appointed general manager of the Broken Hill Proprietary Company, Limited, with headquarters in Melbourne. Mr. Keith Butler is now manager of the Newcastle Steelworks, and Mr. Ian McLennan is assistant manager.

MR. A. WRIGHT has retired from the position of general works manager of Stewarts and Lloyds, Limited, Alfred Hickman Branch, Bilston. He had filled that office for the last ten years. Mr. Wright is retiring from the steel trade and is returning to his native Yorkshire to live at Scarborough. It was with the North-Eastern Steel Company at Middlesbrough, under the late Dr. Arthur Cooper, that he started his career in steel, and after 18 years there went to Palmer's Shipbuilding & Iron Company at Jarrow as rolling mills superintendent. In 1913 he moved to the Bolckow Vaughan Eston Steelworks, and subsequently was for four years at the Llanelly Steelworks. He went to Bilston in February, 1921, as rolling mills manager. In 1925, he was made steelworks manager, and in 1932 was appointed general works manager at Bilston. He is a member of 32 years' standing of the Iron and Steel Institute, a past-president of the Staffordshire Iron and Steel Institute, a member of the Cleveland Institution of Engineers, vice-president of the No. 3 Division of the Iron and Steel Trades Employers' Association, and a member of a number of the committees of the British Standards Institution.

Wills

DRYDEN, W., of Preston, engineer and ironfounder... £29,479

BOWLEY, W. H., of Sheffield, director of Ambrose Shardlow & Company, Limited £7,616

MECHAN, SIR HENRY, chairman of Mechans, Limited, Scotstoun Ironworks, Scotstoun, Glasgow ... £452,066

JACKSON, S. B., of Grangemouth, chairman of the Grangemouth Dockyard Company, Limited ... £29,431

RENOLD, HANS, of Stockport, founder and director of the Renold & Coventry Chain Company, Limited £472,566

JOHNSTON, GEORGE, a director of Barnet & Morton, Limited, iron and steel merchants, etc., of Kirkcaldy £2,522

LIDDELL, ALEXANDER, managing director of John Hawthorn & Company, Limited, Canal Foundry, Newtown, New Mills, Stockport £4,391

BOWER, W. LE NEVE, of Clippesby, chairman and managing director of Barnards, Limited, Norfolk Ironworks, Coslany Street, Norwich £29,831

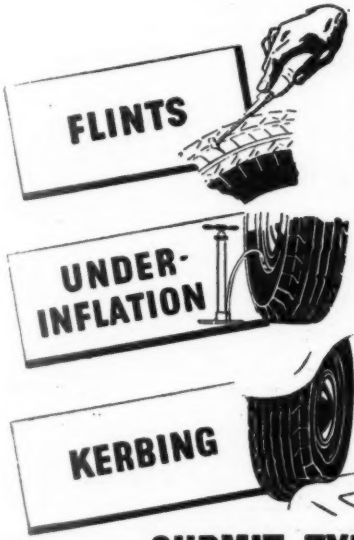
SALE, C. V., chairman of the British Metal Corporation, Limited, and a director of Henry Gardner & Company, Limited, metal merchants, etc. ... £9,073

LANGFORD, C. G., of Esher, director and general manager of Richmonds Gas Stove Company, Limited, a director of George Glover & Company, Limited, gas meter makers, and Clark's Stove Company, Limited £18,664

MINISTRY OF SUPPLY

RUBBER IS SCARCE

DAMAGE THAT MUST BE PREVENTED



Dig embedded flints, glass, nails, etc., out of your tyres every day. Otherwise they will work through the tread into the casing and destroy tyres that *might* have been saved for retreading.

Check air pressure every day. Under-inflated tyres over-flex and over-heat while running. This causes rapid rupture of the fabric.

Bumping over kerbs and big stones rapidly grinds away the fabric. Scraping along kerbs subjects a tyre to damage at its weakest point—the tyre walls.

SUBMIT TYRES FOR REPLACEMENT WHEN SMOOTH

Raw Material Markets

IRON AND STEEL

The pulse of the iron and steel industry maintains a steady beat, and there is no reason to apprehend that the activities of the war industries will be restricted by any shortage of supplies. Producers are, in fact, well abreast of their commitments, and are entering upon the last quarter of the year with substantial tonnages on order.

With the capitulation of Italy and the transfer of the Italian fleet, free access to the Mediterranean ports is now fully restored, and, subject to the provision of transport, which is now more freely available, additional tonnages of North African and Spanish ores should be available for the enrichment of blast-furnace charges.

During the whole of the current year users of high-phosphorus iron have been able to obtain ample supplies at short notice. The demand for refined and low-phosphorus iron, however, has been swollen by the increased activity of the general engineering and allied foundries, whose requirements can only be satisfied by the extensive use of substitutes. This difficulty is now being steadily overcome. More refined iron and more low and medium-phosphorus iron is being produced, and only in regard to hematite is there continued stringency. Licences for parcels of hematite are only issued after the strictest scrutiny, but this is less of a handicap in the production of high-grade castings now that low-phosphorus iron is more plentiful.

Consumption of re-rollable material is now on such a big scale that notwithstanding increased production of billets, blooms, etc., outputs are fully absorbed, and in addition the mills are using large quantities of defectives, crops, etc. Sheet bars, on the other hand, are plentiful, and this section of the trade affords another instance of the manner in which British industry has attained a position of self-sufficiency.

The expansion of the output of naval and merchant vessels from the shipyards of Britain has never been retarded by any shortage of steel, and those establishments, whose specifications are on a rising scale, are still afforded first priority. But as the scope of the invasion plans of the United Nations extends, so do the needs of other industries come more prominently into the picture. Builders of locomotives and rolling stock have undertaken heavier programmes, and will consequently increase the pressure on the plate mills, while the sheet mills are working to capacity on light plates, thick sheets for shipbuilding and lighter gauges for military hutments, containers, etc. Demand for medium and light sections and the special types of steel for colliery maintenance is well maintained, while the rail mills are working at or near capacity limits.

There is rather more activity in the scrap trade. Current requirements are well covered, but with the winter approaching and the likelihood of transport arrangements working less smoothly, consumers are looking ahead and providing for future needs. The steelworks are taking everything that is offered in the way of heavy steel and basic scrap. Light material continues to be a little difficult, but on the whole is finding better outlets. Only the best grades of wrought-iron scrap find a ready market. The demand for good cast-iron scrap is growing, though users seem to be fairly well covered. Short, heavy steel, suitable for foundry work or refined pig-iron making, is readily taken up.

NON-FERROUS METALS

Consumption of the non-ferrous metals must be on a very large scale still, but, judging from the scrap situation, rather less copper at least is being used. The official maximum price for brass swarf is £34 10s. per ton, but sales have been made recently at down to £27, which seems to indicate that sellers have more of this scrap on their hands than has been the case for some time past. While the authorities have steadfastly refused to release supplies for ordinary civilian purposes, all essential needs in copper, spelter and lead have been promptly met throughout the war period. It is reasonable to assume that after four years of war substantial stocks of small-arms and other ammunition have been built up. Furthermore, sinkings at sea have been greatly reduced, and it is probable that the general supply situation is more favourable now than it has been since September, 1939. At the same time, consumption of these three metals must continue to be very heavy indeed so long as hostilities continue, and it is very unlikely that the Control will, for the time being at any rate, ease the tight rein it has held over supplies for a long time now. Tin, of course, is in a different category from the other three main base metals owing to the Japanese conquests in the Far East. In the case of this metal, supplies have to be carefully husbanded and substitutes used wherever possible.

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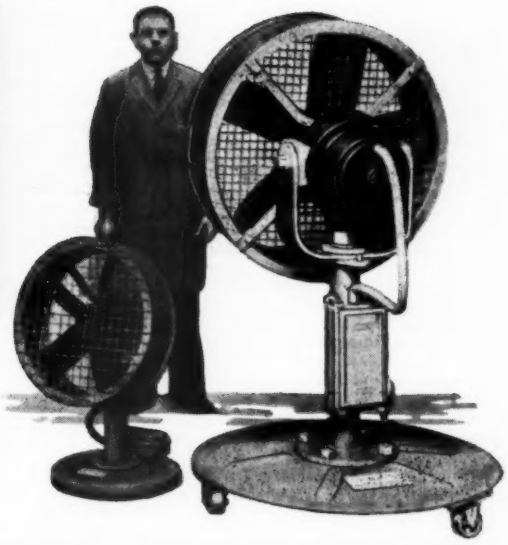

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CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

(*Delivered, unless otherwise stated*)

Wednesday, September 29, 1943

PIG-IRON

Foundry Iron.—CLEVELAND No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. DERBYSHIRE No. 3: Birmingham, 130s.; Manchester, 133s.; Sheffield, 127s. 6d. NORTHANTS No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. STAFFS No. 3: Birmingham, 130s.; Manchester, 133s. LINCOLNSHIRE No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No. 3 for foundries, 3s. below for ironworks.*)

Hematite.—No. 1 (S & P 0.03 to 0.05 per cent.): Scotland, N.-E. Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, 140s. 6d., delivered Birmingham.

Scotch Iron.—No. 3 foundry, 124s. 9d.; No. 1 foundry, 127s. 3d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, 174s.; South Zone, 176s. 6d.

Refined Malleable.—North Zone, 184s.; South Zone, 186s. 6d.

Cold Blast.—South Staffs, 227s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

FERRO-ALLOYS

(*Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.*)

Ferro-silicon (5-ton) lots.—25 per cent., £21 5s.; 45/50 per cent., £27 10s.; 75/80 per cent., £43.

Ferro-vanadium.—35/50 per cent., 15s. 6d. per lb. of V.

Ferro-molybdenum.—70/75 per cent., carbon-free, 6s. per b. of Mo.

Ferro-titanium.—20/25 per cent., carbon-free, 1s. 3½d. lb.

Ferro-tungsten.—80/85 per cent., 9s. 8d. lb.

Tungsten Metal Powder.—98/99 per cent., 9s. 9½d. lb.

Ferro-chrome.—4/6 per cent. C, £59; max. 2 per cent. C, 1s. 6d. lb.; max. 1 per cent. C, 1s. 6½d. lb.; max. 0.5 per cent. C, 1s. 6¾d. lb.

Cobalt.—98/99 per cent., 8s. 9d. lb.

Metallic Chromium.—96/98 per cent., 4s. 5d. lb.

Ferro-manganese.—78/98 per cent., £18 10s.

Metallic Manganese.—94/96 per cent., carb.-free, 1s. 9d. lb.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms and Slabs.—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested, up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s.; free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

Billets, Blooms and Slabs for Forging and Stamping.—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s. 6d.; acid, up to 0.25 per cent. C, £16 5s.

Sheet and Tinplate Bars.—£12 2s. 6d., 6-ton lots.

FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

Plates and Sections.—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s.; joists, 3 in. × 3 in. and up, £15 8s.

Bars, Sheets, etc.—Rounds and squares, 3 in. to 5½ in., £16 18s.; rounds, under 3 in. to ⅜ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.; galvanised fencing wire, 8g. plain, £26 17s. 6d.

Tinplates.—I.C. cokes, 20 × 14 per box, 29s. 9d., f.o.t. makers' works, 30s. 9d., f.o.b.; C.W., 20×14, 27s. 9d., f.o.t., 28s. 6d., f.o.b.

NON-FERROUS METALS

Copper.—Electrolytic, £62; high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £65 10s.

Tin.—99 to under 99.75 per cent., £275; 99.75 to under 99.9 per cent., £276 10s.; min. 99.9 per cent., £278 10s.

Spelter.—G.O.B. (foreign) (duty paid), £25 15s.; ditto (domestic), £26 10s.; "Prime Western," £26 10s.; refined and electrolytic, £27 5s.; not less than 99.99 per cent., £28 15s.

Lead.—Good soft pig-lead (foreign) (duty paid), £25; ditto (Empire and domestic), £25; English, £26 10s.

Zinc Sheets, etc.—Sheets, 10g. and thicker, ex works, £37 12s. 6d.; rolled zinc (boiler plates), ex works, £35 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £30 10s.

Other Metals.—Aluminium, ingots, £110; antimony, English, 99 per cent., £120; quicksilver, ex warehouse, £68 10s. to £69 15s.; nickel, £190 to £195.

Brass.—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16d.; rods, drawn, 11¾d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 10¾d.; wire, 10¾d.; rolled metal, 10¼d.; yellow metal rods, 9d.

Copper Tubes, etc.—Solid-drawn tubes, 15½d. per lb.; brazed tubes, 15½d.; wire, 10d.

Phosphor Bronze.—Strip, 13¾d. per lb.; sheets to 10 w.g., 14¾d.; wire, 16d.; rods, 16d.; tubes, 21¼d.; castings, 19d., delivery 3 cwts. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

Nickel Silver, etc.—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4¼d. to 1s. 10¼d.; to 15 in. wide, 1s. 4¼d. to 1s. 10¼d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11¼d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6¼d. Ingots rolled to spoon size, 1s. 1d. to 1s. 9¼d. Wire round, to 10g., 1s. 7¼d. to 2s. 2¼d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6¼d. upwards.

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Controlled Maximum Prices.—Bright untinned copper wire, in crucible form or in hanks, £57 10s.; No. 1 copper wire, £57; No. 2 copper wire, £55 10s.; copper firebox plates, cut up, £57 10s.; clean untinned copper, cut up, £56 10s.; braziery copper, £53 10s.; Q.F. process and shell-case brass, 70/30 quality, free from primers, £49; clean fired 303 S.A. cartridge cases, £47; 70/30 turnings, clean and baled, £43; brass swarf, clean, free from iron and commercially dry, £34 10s.; new brass rod ends, 60/40 quality, £38 10s.; hot stampings and fuse metal, 60/40 quality, £38 10s.; Admiralty gunmetal, 88-10-2, containing not more than ½ per cent. lead or 3 per cent. zinc, or less than 9½ per cent. tin, £74 10s., all per ton, ex works.

Returned Process Scrap.—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended Sept. 25, where buyer and seller have not mutually agreed a price; net, per ton, ex-sellers' works, suitably packed):—

BRASS.—S.A.A. webbing, £48 10s.; S.A.A. defective cups and cases, £47 10s.; S.A.A. cut-offs and trimmings, £42 10s.; S.A.A. turnings (loose), £37; S.A.A. turnings (baled), £42 10s.; S.A.A. turnings (masticated), £42; Q.F. webbing, £49; defective Q.F. cups and cases, £49; Q.F. cut-offs, £47 10s.; Q.F. turnings, £38; other 70/30 process and manufacturing scrap, £46 10s.; process and manufacturing scrap containing over 62 per cent. and up to 68 per cent. Cu, £43 10s.; ditto, over 58 per cent. to 62 per cent. Cu, £38 10s.; 85/15 gilding metal webbing, £52 10s.; 85/15 gilding defective cups and envelopes before filling, £50 10s.; cap metal webbing, £54 10s.; 90/10 gilding webbing, £53 10s.; 90/10 gilding defective cups and envelopes before filling, £51 10s.

CUPRO NICKEL.—80/20 cupro-nickel webbing, £75 10s.; 80/20 defective cups and envelopes before filling, £70 10s.

NICKEL SILVER.—Process and manufacturing scrap: 10 per cent. nickel, £50; 15 per cent. nickel, £56; 18 per cent. nickel, £60; 20 per cent. nickel, £63.

COPPER.—Sheet cuttings and webbing, untinned, £54; shell-band plate scrap, £56 10s.; copper turnings, £48.

IRON AND STEEL SCRAP

(*Delivered free to consumers' works. Plus 3¾ per cent. dealers' remuneration. 50 tons and upwards over three months, 2s. 6d. extra.*)

South Wales.—Short heavy steel, not ex. 24-in. lengths, 82s. to 84s. 6d.; heavy machinery cast iron, 87s.; ordinary heavy cast iron, 82s.; cast-iron railway chairs, 87s.; medium cast iron, 78s. 3d.; light cast iron, 73s. 6d.

Middlesbrough.—Short heavy steel, 79s. 9d. to 82s. 3d.; heavy machinery cast iron, 91s. 9d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 89s. 3d.; medium cast iron, 79s. 6d.; light cast iron, 74s. 6d.

Birmingham District.—Short heavy steel, 74s. 9d. to 77s. 3d.; heavy machinery cast iron, 92s. 3d.; ordinary heavy cast iron, 87s. 6d.; cast-iron railway chairs, 87s. 6d.; medium cast iron, 80s. 3d.; light cast iron, 75s. 3d.

Scotland.—Short heavy steel, 79s. 6d. to 82s.; heavy machinery cast iron, 94s. 3d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 94s. 3d.; medium cast iron, 77s. 3d.; light cast iron, 72s. 3d.

(NOTE.—*For deliveries of cast-iron scrap free to consumers' works in Scotland, the above prices less 3s. per ton, but plus actual cost of transport or 6s. per ton, whichever is the less.*

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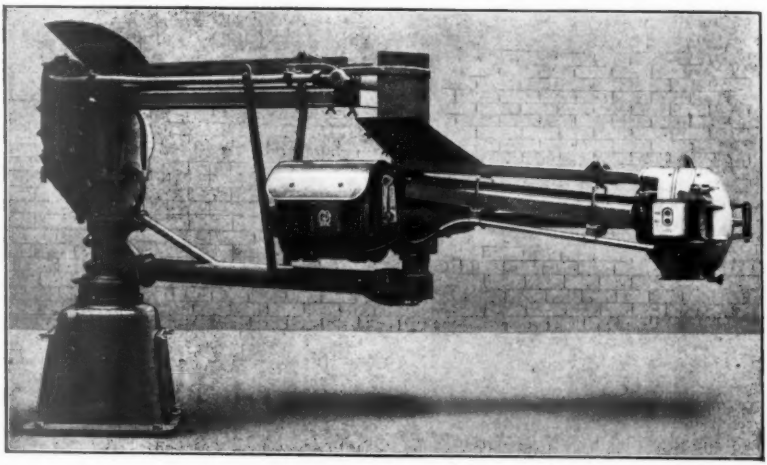

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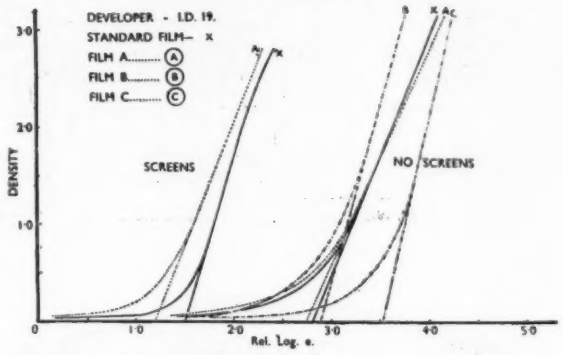

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